

A Reanalysis of Recursive Compounds

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1. Introduction

Recursion is said to be a fundamental property of human language that potentially differentiate language both from other human cognitive domains and known communication systems in animals (Hauser, Chomsky and Fitch 2002). The aim of this paper is to find out whether recursion of compounding is found in unrelated languages or not and whether the existence of a linking morpheme in compounds has anything to do with the recursivity of compounding in the given language. Knowing about recursivity of compounds will reveal some aspect of human language, different to those of other animals.¹ Also, looking at compounds in unrelated languages will enable us to understand universality of compounding.

Before starting the discussion, let us define what recursion in compounding is. Following Parker (2006), Bisetto (2010), argues that what is admittedly called recursion can be categorised into recursion and iteration. Recursion involves embedding at the edge or in the center of an action or object of an instance of the same type. On the other hand, iteration, is the simple unembedded repetition of an action or object. To show the difference of the two types let us consider the following English compounds.

- (1) [student [film society]]
- (2) [American [student [film society]]]
- (3) [[[[student [film society]] committee] scandal] inquiry]

(Bisetto 2010: 20)

In (1), the compound *film society* is expanded on the left side by means of the merger of a new constituent, *student*, and in (2), the compound *student film society* is enlarged through addition on the non-head side of the adjective *American*. These are iteration, as the adjunction of these constituents enables the denotation of the head constituent more restricted, by adding specification or modification. On the other hand, (3) is recursion, since each process of constituent addition implies the preceding object/action the base constituent refers to. The merger of a new head, in fact, introduces a new referent bound to the preceding one (Bisetto 2010).

This paper will be organised as follows. First, recursive compounds in some languages will be looked at to see whether the existence of a linking morpheme is related to the recursivity of compounds. Next, it will be shown that there are also languages with iterative compound with a linking morpheme inside. This section will be followed by observations of languages of exceptions. The conclusion of this paper will be an answer to the hypothesis.

2. Recursive compounds

2.1 Recursive compounds with a linking morpheme

As discussed in the previous section, compound formation can be recursive, just as phrase formation is. This is especially true for noun-noun compound words. Let us observe recursive compounds in Germanic languages.

- | | |
|-------------------------------|-------------------------------------|
| (4) fot+boll-s-domare | Swedish |
| foot+ball-LINK-referee | |
| ‘football referee’ | |
| (5) under+grund-s-vand | Scandinavian languages ² |
| under+ground-LINK-water | |
| ‘underground water’ | |
| (6) fag+forening+præsident | Norwegian & Danish |
| subject+association+president | |
| ‘labour union president’ | |

According to Josefsson (1997), the *-s* in the Mainland Scandinavian, represented in (4)-(5) can be called a linking element or a liaison form and it is a morpheme without independent meaning. The linking morpheme is realised phonetically in Scandinavian recursive compounds, and it must be used to get this structure and interpretation. Without the linking morpheme, Swedish is strictly iterative compounds. For example, without a linking morpheme the compound in (4) is interpreted only as ‘ball referee for foot’, whereas with one, the compound is interpreted as ‘football referee’. As for Norwegian and Danish, the examples (5) and (6) show that linking morpheme is not always required in recursive compounds. The above examples all have to have a linking morpheme to gain the interpretation represented there.

In other non-English Germanic languages, too, there are a number of recursive compounds and a linking morpheme is realised between the constituent as the following examples show.

- | | |
|--|--------|
| (7) fahrrad kurrier jacke | German |
| bicycle courier jacket | |
| ‘bicycle courier jacket’ | |
| (8) dampf+schiff+fahrt-s-gesell+schaft-s-kapitän-s-mütze | German |
| steam+ship+journey-LE-journey+man-SUF-LE-captain-LE-cup | |
| ‘cup of the captain of the steam ship company’ | |

Unlike in Scandinavian languages, German recursive compounds do not have to have a linking morpheme, as the above two examples show (Bisetto 2012).

- | | |
|--|-------|
| (9) weer-s-voorspelling-s-deskundige-n-congres | Dutch |
| weather-LE-forecast-LE-experts-n-conference | |
| ‘conference for weather forecast experts’ | |
| (10) boek+handl-s-korting | Dutch |

book+shop-LE-discount

‘bookshop discount’

Dutch recursive compounds do not have to have a linking morpheme, either.

Scandinavian languages, Dutch and German do have iterative compounds, too. The examples are as follows.

(11) barn+bog+klubb

Scandinavian languages

child+book+club

‘book club for children’

(12) Plastik+garten+zwerg

German

plastic+garden+dwarf

‘plastic garden dwarf’

(13) beroep-s-auto+andelaar

Dutch

professional-LE-car+dealer

‘professional car dealer’

The difference between recursive and iterative compounds corresponds to a meaning difference. For example, the example (11) means ‘book club for children’. In contrast, the left-branching compound with a linking morpheme means ‘club for children’s book’. In Dutch, the linking element exists in iterative compounds as the above example shows.

2.2 Genitive compounds with a linking morpheme

Scandinavian languages, Dutch and German all have a linking morpheme between the two constituents in simple compounds, such as the examples below show. Firstly, in Scandinavian languages, there are some compound words whose first constituent is marked with a linking element, such as *-s* or *-e*.

(14) fred-s-konference

Danish

peace-LE-conference

‘peace conference’

(15) bord-s-lamp

Swedish

table-LE-lamp

‘desk lamp’

(16) jul-e-gave

Danish and Norwegian

Christmase-LE-present

‘Christmas present’

The phonetic form of the linking element corresponds to the genitive marker. The left-hand constituent of the compound word has either a linking morpheme (examples (14) and (15)), or vowel morpheme (example (16)). According to Josefsson (1997), Holmberg (1992) and Mellenius (1997), the *-s* in the Mainland Scandinavian can be called a linking morpheme or a liaison form and it is a morpheme without

independent meaning.

Similarly, in German, a linking morpheme occurs in noun-noun compound words. The inflectional class of the left-hand constituent determines whether a linking morpheme occurs and what kind. They are *-e*, *-es*, *-en*, *-er*, *-n*, *-ens*, *-s*, and *-ns* (Bisetto 2012). For example, *-er* only ever occurs in classes where it is licensed in the nominative plural (for example (19)). Let us see some typical examples of compounds with linking morphemes in German.

(17) Kind-er-wagen (Wiese 1996: 143)

child-PL-cart

'buggy'

(18) Schwein-e-braten (Collins German Dictionary 2004: 708)

pig-PL-roast

'roast pork'

(19) Frau-en-held (Collins German Dictionary 2004: 968)

woman-PL-hero

'womanizer'

(20) Tag-es-zeit (Wiese 1996: 143)

day-PL-time

'daytime'

The morpheme comes from a former inflectional ending of a genitive, singular or plural (Bisetto 2012).

Similarly in Dutch, the following examples show that there are genitive compounds.

(21) Schaap-s-kop

sheep-LE-head

'simpleton'

(22) eend-e-kroos

duck-LE-weed

'duckweed'

(Bisetto 2012)

According to Booij (2002), an extended form of a noun with an additional schwa or *-s* exists in compounds. As the linking morphemes in Scandinavian languages, the schwa and the /s/ in Dutch do not contribute to the meaning of the compounds. Another similar characteristic of the linking morphemes in Dutch to those in Scandinavian languages is that they both are historically a genitive suffix.

In this section, it has been argued that recursive compounds do exist in some of the Germanic languages and it has become clear that both recursive compounds in Scandinavian languages have a linking morpheme, whereas iterative compounds do not. On the other hand, recursive and iterative compounds in Dutch and German sometimes have a linking morpheme. In addition, these languages have so-called genitive compounds where a linking morpheme exists between the two constituents of the compounds. The linking morpheme is homonym of the one in recursive or iterative compounds. In the next section,

compounds in other languages will be observed.

2.3 Compounds with a linking morpheme in languages

In the following languages, there are so-called genitive compounds with a linking morpheme, homonym of the linking morpheme in recursive compounds in the given language. This is true even when recursive compounds do not have a linking morpheme. These languages are English, Finnish, Hungarian, Latvian, Lithuanian, Japanese, and Korean.

Let us consider some examples of genitive compounds in English.

(23) children's book

(24) woman's magazine

(25) Mother's Day (Shimamura 1986, Taylor 1996)

Shimamura (1986) and Taylor (1996) argue that genitive compounds are similar to compound words. Firstly, they argue that the semantics of genitive compounds follow from their status as a noun, not as a noun phrase. A genitive compound denotes a type of entity, not an instance of a type. Generally, the designated type is a subcategory of the type denoted by the second constituent. For example, 'woman's magazine' is a type of magazine for women in general. Another characteristic is that the *-s* morpheme is not equivalent to that in prenominal possessives. Shimamura states that it is neither a derivational nor an inflectional suffix. It is not a derivational suffix, as it does not affect the category of the first constituent as a normal derivational suffix does. On the other hand, it is not inflectional suffix, as an inflection cannot usually go inside a word.

Like the following examples show, there are recursive compounds in English but they do not have a linking morpheme.

(26) gourmet coffee cup

'cup for gourmet coffee'

(27) coffee maker maker

'maker for coffee maker'

(28) Labour Union president

'president of Labour Union'

Just like in non-English Germanic languages, the interpretation is different from that of the base compound. For example, the interpretation of the compound *gourmet coffee* is something to do with coffee. But by adding the new constituent, *cup*, the interpretation changes to *cup for gourmet coffee*.

English has iterative compounds, too. Some examples are as follows:

(29) adult book club

'book club for adults'

(30) evening computer class

'computer class in the evening'

(31) restaurant coffee cup

‘coffee cup for restaurants’

(32) student film committee

‘film committee for students’

Like in the non-English Germanic languages, again, they are typical iterative compounds in that the interpretation of the whole compound is different from that of their corresponding recursive compound.

Other languages that behave similarly, i.e. those which have recursive compounds without a linking morpheme and genitive compounds are as follows. Finnish has compounds similar to those of Germanic languages (Karlsson 1987). The most common type of compound is made up of two non-derived nouns.

(33) kirja+kauppa

book+store

‘bookshop’

(34) vesi+pullo

water+bottle

‘water+bottle’

(35) pallo+pele

ball+game

‘ball game’

It is not just juxtaposition of two nominal elements. The left-hand constituent of these compounds is often in genitive case (Spencer 2003). Also, there are compounds with more than two elements.

(36) maa+talous+tuotanto

land+cultivation+production

‘agricultural production’

(37) elo+kuva+teollisuus

live+picture+industry

‘film industry’

(38) huone+kalu+tehdas

room+thing+factory

‘furniture factory’

(39) koti+tarve+myynti

home+need+sale

‘household sale’

This language seems to be a case where compounding is recursive, as the above examples show.

In Hungarian, there is a construction of bare noun + verb sequences which behave very much like compounds (Kiefer 1990): they constitute of a single phonological unit and can easily undergo lexicalisation, and the bare noun is non-referential and non-modifiable. At the same time, they are not

syntactic islands in that they can be affected by certain syntactic rules, such as focusing and negation. Moreover, auxiliaries may split up the sequences. Typical examples are as follows:

(40) Jancsi házat épít.

Johnny house-acc built

‘Johnny is engaged in house-building’.

(41) Pisti levelet ír.

Steve letter-acc write

‘Steve is engaged in letter-writing’.

(Kiefer 1990: 151)

As these examples demonstrate, the bare noun in this sequence is always case-marked and thematically marked just like the corresponding constructions in Germanic languages. Also, Hungarian compounding is recursive,³ just like in Germanic languages. Typical examples are as follows:

(42) vér+nyomás+mérő

blood+pressure+measuring

blood pressure measuring’

(Kiefer 2009)

(43) gramat-a veikals

of-book shop

‘bookshop’

In Latvian (Spencer, personal communication), noun-noun compounds are formed from uninflected stem forms, just like the example above. The form *gramat-* is a stem (or a root) which cannot surface as such in the syntax. However, in addition to this construction Latvian has a number of noun-noun compounds whose first member is in the genitive (either singular/plural) case. Typical examples are as follows.

(44) latvieš-u valoda

of-the Latvians language

‘Latvian language’

(45) ziemasvetki

of-winter festival

‘Christmas’

(Mathiassen 1997: 55-56)

These are in the same form as normal genitive construction but thought of as compounds and have a stress on the left constituent. The basic types are uninflected root + word and noun-gen.pl + word as illustrated in the following examples:

(46) Gra’mat-a

‘book’

(47) veikals

‘shop’

(48) gra’mat-u veikals

book-gen.pl shop

‘bookshop’

(Spencer: personal communication)

Semantically these compounds do not really mean ‘the shop of (the) books’. The genitive case marker is used purely in a modifying function and does not syntactically function. They represent a kind of compound in which the left-hand member is inflected. In this respect they are like the internally inflected compound nouns of Finnish and is slightly similar to that of Germanic genitive compounds.

Similarly, but a little bit differently from Latvian is Lithuanian. The linking morpheme is not homophonous with an inflected form of the compounded word, unlike in Germanic compounds. Lithuanian also has compounds consisting of noun-gen.pl + noun (Mathiassen 1997: 1179-180). Thus, to translate ‘Lithuanian’, ‘Latvian’ in the sense of ‘the Lithuanian/Latvian language’ into these languages.

(49) Lietuv-iu kalba Lithuanian

Lithuanian.man-gen.pl language

‘Lithuanian language’

(50) Latvies’-u valoda Latvian

Latvian.man-gen.pl language

‘Latvian language’

According to Spencer (personal communication) compounding in both Latvian and Lithuanian is recursive and have genitive compounds, much as in Germanic.⁴

Let us look at some Asian languages. First, Japanese has a number of genitive and recursive compounds.

(51) mago-no-te

grandchild-gen.-hand

‘back scratcher’

(52) haha-no-hi

mother-gen.-day

‘mother’s day’

The above examples show that there is a genitive case marker between the two morphemes, *mago* and *te* and *haha* and *hi*. These examples are not genitive phrases because of the following reasons. In (51), the meaning of the whole compound is different to that of its corresponding phrase *mago no te* ‘grandchild (ren)’s hand(s)’. Also, their accents are different. The compound does not attract a falling tone, whereas its corresponding phrase has a falling tone on *no*. In (52), the *haha* does not specify someone’s mother, for example, Karen’s mother unlike in its corresponding phrase. This compound denotes general concept. In other words, it is a day for anyone’s mother.

(53) kokka+koan+iinkai

nation+security+committee

‘National Security Council’

(54) hahaoya+gakkyu+tekisuto

mother+class+text

‘text for mother’s class’

(55) kaigai+ryokoo+hoken

abroad+travel+insurance

‘travel insurance for going abroad’

As the above examples show, a linking morpheme does not exist in Japanese recursive compounds, as in English. However, there are a number of recursive compounds, including already existing ones as well as nonce ones. Japanese also has iterative compounds, as the following examples show.

(56) #kodomo+hon+kurabu

child+ book+ club

‘book club for children’

(kodomo no hon kurabu)

GEN

(57) #otona+hon+kurabu

adult+book+club

‘book club for adults’

(otona no hon kurabu)

GEN

(58) #yoru+konpyutaa+kurasu

evening+computer+class

(yoru no konpyutaa kurasu)

GEN

(59) resutoran+koohii+kappu

restaurant+coffee+cup

‘coffee cup for restaurant’

Native speakers of Japanese seem to prefer the corresponding phrases of the examples marked with the symbol #, but they are grammatical. For some reason, iterative compounds are more restricted than recursive compounds. It is hard to construct iterative compounds with more than three constituents. This is also the case in Scandinavian (Josefsson 1997), although ambiguity is not a problem due to the presence of an overt linking morpheme. The explanation may be constraints on processing. A compound with too much recursivity without constituents (iterative compounds) may cause processing problems. In recursive compounds, the speaker forms a constituent out of adjacent roots earlier than in iterative compounds, where a constituent cannot be formed until the last constituent is pronounced (Hawkins 1990).

In Korean genitive compounds seem to exist.

(60) kwukkwun-uni nal

soldier gen. day

‘soldier’s day’⁵

The genitive case marker *uni* inside functions is assumed as a linking morpheme. Korean noun-noun compounding is very productive. Tokizaki (2011:5) states that Korean compounding is recursive. An example is as follows.

(61) on+chən+yok

warm+spring+bathe

‘bathing in a hotspring’.

In this section, it has been shown that there are recursive compounds in some unrelated languages and these languages have a linking morpheme in recursive compounds and two-member compounds. These do not show that linking morpheme enables the language in question to have recursive compounds. In the next section, iterative compounds in some languages are shown.

3. Iteration with a linking morpheme

The last subsection presented languages with a linking morpheme in recursive compounds. There are languages with iterative compounds with a linking morpheme. These languages contradict the claim that linking morpheme exists only in recursive compounds, as Mukai (2008) claims. Let us see recursive compounds in one of such languages, Greek.

(62) aghrot-o-dharni-o-dh?tisi

farmer-LE-loan-LE-giving

‘money-lending to farmers’

(63) pedh-o-odhont-iatros

child-LE-tooth-doctor

‘a children’s dentist’

(64) asvest-o-polto-piisi

lime-LE-pulp-making

‘lime-pulp-making’

(Bisetto 2010)

What is interesting and different from compounding in Germanic languages is that there is a linking morpheme after each constituent, whilst in Germanic languages, there is a linking morpheme after embedded compounds, not each constituent.⁶ Also, where the noun-noun pattern is productive and the two constituents host a linking vowel between them, addition of new constituents is not allowed on the head side but only on the non-head one. According to Agathopoulou (personal communication),⁷ for Greek native speakers, multistemmed compounds like the above in which the two initial constituents are in a hierarchical relation are relatively rare in the language. The example in (65) is made up by Di Sciullo and Ralli (1994). They maintain that it is acceptable by native speakers, and the examples in (66) and (67) are among the very few of this kind in the data given by Agathopoulou.

(65) ot-o-rin-o-laring-o-l?ghos

ear-LE-nose-LE-throat-LE-expert

‘ear, nose, and throat specialist’

(66) kafe+zith+estiat?rio

coffee+ale+restaurant

‘a coffee-and ale-shop’

(67) skulik-o-mirmingh-?-tripa

worm-LE-ant+hole

‘a worm- and ant-hole’

One might say that there is another contradiction against Mukai (2008) in Turkish. It has unrestricted iterative compounds, but recursive compounds is constrained by the rule that multiple adjacent occurrences of the linking morpheme. However, this is due to the fact that the linking morpheme is final. So this is not really a contradiction, but we can say that a linking morpheme actually plays a role for recursivity (Bisetto 2010). The following examples show the iterative compounds in Turkish with a linking morpheme.

(68) gençlik+ask-i-roman-i-kahraman-i

youth+love-LE-novel-LE-hero-LE

‘character in a youth romance’

(69) roman+kahraman-i

romance+hero-LE

‘character of a novel’

(70) ask+roman-i-kahraman-i

love+romance-LE-hero-LE

‘character in a romantic novel’

(Bisetto 2012)

As the examples above show, a linking morpheme in Turkish is final and signals subordination (Scalise and Bisetto 2009), i.e. modified-modifier.

These two languages also have genitive compounds just like the languages discussed in the paper, as English, Mainland Scandinavian and German. The following examples show that this claim is right.

(71) nixt-o-lúludo

Greek

night-LE-flower

(72) düksn+vitrin-i

Turkish

shop+window-LE

(Bisetto 2012)

In Greek, the linking morpheme exists between the two constituents, whereas in Turkish it exists at the end of the head constituent.

Word formation in Slavic languages is similar to that of Romance languages in that word formation is from derivation rather than compounding (Clark 1993).⁸ This is also true in children’s spontaneous speech. Children seem to prefer coining new nouns through derivation rather than compounding (Clark 1993).

However, there is an additional type of compounding in these languages. For example, in Polish, when compounding takes place, a linking morpheme, similar to that in Germanic languages, does appear between the two constituents of compounds.

- (73) gwiazd-o-zbiór
star-LE-collection
'constellation'

- (74) star-o-druk
old-LE-print
'antique book'

(Szymanek 2009)

Also, although limited in number, recursive compounds exist in these languages and there are coordinate adjectival compounds.

- (75) polsjo+rosyjsko+ukrainskie
Polish+Russian+Ukrainian
'Polish Russian Ukrainian'

A number of linguists have argued that recursive compounds do not exist in Romance languages. However, formations such as: *direttore reparto giocattoli* 'toy department manager' do exist though they are not so frequent and are mainly used as headlines in newspapers or labels on office-doors.⁹

Also, some 'V-N' compounds can be iterative compounds. A verb can be adjoined on the left-hand side.

- (76) porta+stuzzica+denti
carry 3.pres+pick+teeth
'toothpick-holder'
- (77) porta-asciuga-mani
carry 3.pres+dry-hands
'towel-holder'
- (78) proteggi-reggiseno
protect-bra
'bra-protector'

(Bisetto 2010)

In these examples, the base compounds (*stuzzicadenti*, *asciugamani*, *reggiseno*) work as the internal direct object of the added verb, just like the nouns (*denti*, *mani* and *seno*) in the base verb+noun compounds do.

It is often said that compounding is not productive in Romance, compared to Germanic languages. However, Scalise and Bisetto (2009) say that it is productive and compounding of types which Germanic languages do not have so many.

In Spanish, there are compounds with a linking morpheme, like the following examples show.

- (79) pel-i-rojo

hair-LE-red

‘red haired’

(Scalise and Fabregas 2010: 115)

4. No recursion

Latin compounding is not so productive as Germanic languages or the Asian languages which this paper has discussed. Usually, where the other languages have compounding, Latin has affixation and agglutination and fewer sub-types of compounding. For example, Latin determinative compounds (normal type) and bahuvrihi or exocentric compounds. Compounding in Latin is not recursive. There are no genitive compounds either in this language (Josefsson 2005).

The Table 1 is a summary of the observation of the languages discussed so far. The second column shows whether the language has productive and recursive compounds and the final column shows whether there is a linking morpheme or not in the language.

Table 1. Recursivity of compounds and linking morpheme

Languages	Recursive	linking morpheme
Swedish	Yes	Yes
Danish	Yes	Yes
Norwegian	Yes	Yes
German	Yes	Yes
Dutch	Yes	Yes
English	Yes	Yes in genitive
Finnish	Yes	Yes in genitive
Hungarian	Yes	Yes in genitive
Latvian	Yes	Yes in genitive
Lithuanian	Yes	Yes in genitive
Italian	Yes but not so many in coordinative and VNN	Yes in neoclassical compounds
Spanish	Yes coordinative VNN	Yes in compounds
Russian	Yes coordinate	Yes in compounds
Polish	Yes coordinate	Yes in compounds
Slovakian	Yes coordinate	Yes in compounds
Czech	Yes coordinate	Yes in compounds
Latin	No	No
Japanese	Yes	Yes in genitive
Korean	Yes	Yes in genitive

6. Conclusion

In this paper, the questions whether recursive compounding exists in unrelated languages or not and whether a linking morpheme enables recursivity of compounding have been examined. It has been found that the languages that have been researched have a linking morpheme in recursive compounds and/or some kind of compounds, except for Latin. Also, Romance languages do not have as productive recursive compounds as the other languages. However, this does not seem to be due to non-existence of a linking morpheme, as a linking morpheme does exist. There clearly needs to be more research on more languages of the world to see the questions can be answered.

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- 1 Parker (2006) argues against Hauser, Chomsky and Fitch (2002). However, this paper will not discuss recursivity in human language.
- 2 When the example has 'Scandinavian languages' written beside, it means that the word exists in all the three languages, Swedish, Danish and Norwegian. When the example has only the language, the example is from only the language.
- 3 I would like to thank Mr. Fejes for his comment.
- 4 I would like to thank Prof. Spencer for commenting on this matter.
- 5 I would like to thank Ms. Winnie for the data.
- 6 More precisely, after every left-branching constituent in a word, as derived words also require the linker (see Josefsson 1997) *barn+dom+s+minne* (child+hood+LINK+memory) in Swedish.
- 7 I would like to thank Dr. Agathopoulou for her comments.
- 8 I would like to thank Prof. Wayles Browne for his comments on this topic.
- 9 I thank Prof Bisetto for commenting on these topics.

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